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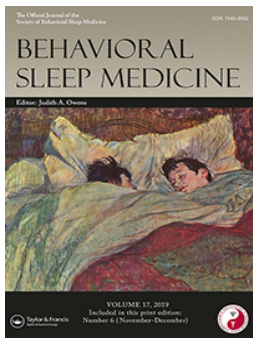
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# Managing Acute Insomnia in Prison: Evaluation of a “One-Shot” Cognitive Behavioral Therapy for Insomnia (CBT-I) Intervention

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## ABSTRACT

**Objectives/Background:** Insomnia is a serious condition that affects over 60% of the prison population and has been associated with aggression, anger, impulsivity, suicidality, and increased prison health care use. Nonpharmacological interventions for prison inmates are scarce despite the high prevalence and significant consequences of insomnia among those incarcerated. The aim of the present study was to examine the preliminary efficacy and effectiveness of a one-shot session of cognitive behavioral therapy for insomnia (CBT-I) for prison inmates with acute insomnia in an open trial. **Method/Participants:** The intervention consisted of one 60–70 min session of CBT-I and a self-management pamphlet. A consecutive series of 30 adult male offenders with acute insomnia from a UK prison completed measures of prospective sleep (daily sleep diary), insomnia symptoms severity (Insomnia Severity Index), and mood symptoms (Patient Health Questionnaire and General Anxiety Disorder) one week before and four weeks after receiving the intervention. **Results:** Pairwise *t*-tests revealed that a single shot of CBT-I was effective in reducing the severity of insomnia in adult male offenders ( $t = [29], 12.65, p < 0.001$ ). Further, the results demonstrated moderate to large effect sizes for reductions in depressive ( $d_{RM} = 0.77$ ) and anxious ( $d_{RM} = 0.83$ ) symptoms, as well as insomnia severity ( $d_{RM} = 2.35$ ). **Conclusions:** A single-shot session of CBT-I is effective in managing acute insomnia and mood (depression, anxiety) symptoms in adult male prison inmates. Future research should focus on testing if the single-shot CBT-I intervention can be implemented and disseminated in other settings and populations (e.g., female and juvenile or youth offenders).

An estimated 11–81% of prison inmates report insomnia symptoms (Dewa, Kyle, Hassan, Shaw, & Senior, 2015). The wide variation among studies may be due to different criteria used to define insomnia as well as different measures used to assess insomnia symptoms. For example, requests for hypnotics were used as an indicator of insomnia in one study (10.9%; Kjelsberg & Hartvig, 2005), whereas other studies, with much higher prevalence rates, used clinical screening instruments or general health questionnaires with one or two sleep-related items embedded within (e.g., 74%, Singleton, Meltzer, & Gatward, 1998; 71.6%, O’Brien, 2001). The only study to date that has used an insomnia-specific measure, the Sleep Condition Indicator (Espie et al., 2014), suggests an overall prevalence rate for Insomnia Disorder of 61.6%, with women significantly more likely to report insomnia, in prison, compared to men (Dewa, Hassan, Shaw, & Senior, 2017).

The consequences of insomnia in prison inmates include aggression, anger, impulsivity, and increased prison health care use (Barker, Ireland, Cu, & Ireland, 2016; Feron, Paulus, Tonglet, Lorant, & Pestiaux, 2005; Ireland & Culpin, 2006). Importantly, as insomnia has been associated

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with suicide ideation, suicide attempts, and completed suicides both in the general population and in prison populations, the additive impact of insomnia and disrupted mood is likely to increase the vulnerability to suicide in this population (Carli et al., 2011). As such there is a critical need to address the development and treatment of insomnia in prison inmates.

Despite a significant amount of research focused on the development and treatment of other mental and physical conditions in the prison population, there is a dearth of literature examining the development and treatment of insomnia within the prison environment (Dewa et al., 2015). Spielman's three-factor model of insomnia may be beneficial in attempting to understand the development and maintenance of insomnia in this population. The model posits that insomnia usually begins with the combination of a predisposition toward insomnia (e.g., high emotional reactivity) paired with a precipitating event (e.g., a stressful event). The transition to chronic insomnia is usually perpetuated by several factors, which may include an increased effort to induce sleep in response to distress about poor sleep and conditioned arousal (whereby the bed becomes a cue for arousal rather than sleep), which serve to maintain the sleep problem. Within this context, imprisonment may act as the initial precipitating factor contributing to the onset of insomnia (Elger & Sekera, 2009). In fact, in one study, 60% of non-substance-misusing prisoners reported symptoms of insomnia starting within their first few weeks of imprisonment (Elger, 2004). The high prevalence rate of mental health disorders and substance abuse in prison inmates in conjunction with the stress of sentencing and incarceration may also serve to precipitate insomnia. One study demonstrated that 83% of prison inmates with insomnia reported anxiety or depression as the initial cause (Elger, 2004).

In addition, the constraints of the prison environment may also serve as a perpetuating factor that continues to exacerbate insomnia, including the separation from family and loved ones, strictly enforced routines and sleep-wake schedules, limited exercise or physical activity, shared living and sleeping space, lack of privacy, safety concerns, limited access to sunlight, and environmental factors (e.g., noise, light, temperature, mattress and bedding; Elger, 2009; Eytan et al., 2011; Hassan, Edge, Senior, & Shaw, 2013; Singleton et al., 1998; Toler, 1978). Further, spending a significant amount of time in a prison cell on a cot that is not only used for sleep but also activities of daily living (e.g., sitting, socializing, watching television, reading, writing, eating, napping) may contribute to conditioned arousal serving to perpetuate insomnia (Ireland & Culpin, 2006). Therefore, it is not surprising that hypnotic and anxiolytic use is 10 times higher for prison inmates (even when limiting to patients with no known history of substance misuse) compared to community-dwelling outpatients (Elger, Goehring, Revaz, & Morabia, 2002; Hassan et al., 2014).

Cognitive behavioral therapy (CBT), a psychotherapeutic approach that targets cognitions and behaviors that cause and maintain a problem, has been adapted to many psychiatric disorders including insomnia. Cognitive behavioral therapy for insomnia (CBT-I) is an effective nonpharmacological treatment for insomnia. CBT-I is a structured, short-term, skill-focused psychotherapy aimed at changing maladaptive cognitions (i.e., thoughts and beliefs) and behaviors contributing to insomnia. The weight of evidence supporting CBT-I, summarized in several meta-analyses, led to its recognition as a first-line treatment for insomnia by the British Association of Psychopharmacology, European Sleep Research Society, and American College of Physicians (Qaseem, Kansagara, Forciea, Cooke, & Denberg, 2016; Riemann et al., 2017; Wilson et al., 2010). Improvements following CBT-I are equivalent to those achieved during acute treatment with hypnotic medications, and its effects are more durable after treatment discontinuation (Edinger, Wohlgemuth, Radtke, Marsh, & Quillian, 2001; Mitchell et al., 2012; Morin, Colecchi, Stone, Sood, & Brink, 1999). Further, studies have shown that the treatment of insomnia using CBT-I is associated with reductions in depressive and anxious symptomology in addition to suicide ideation (Manber et al., 2014; Taylor & Pruiksma, 2014; Trockel, Karlin, Taylor, Brown, & Manber, 2015).

Although it would appear that a full CBT-I delivery model would be the treatment of choice in the prison population, there may be a more timely and cost-effective method for managing insomnia in this context. Several research groups have created briefer versions either with the behavioral components alone (i.e., Brief Behavioral Therapy for Insomnia [BBTI]; Buysse et al., 2011; Germain,

Shear, Hall, & Buysse, 2007) or abbreviated versions of CBT-I (Edinger & Sampson, 2003; Lovato, Lack, Wright, & Kennaway, 2014). These briefer versions range between one and four sessions and have been demonstrated to effect change in individuals with insomnia. The shortest of all the brief versions of BBTI that demonstrated significant improvements in subjective sleep was a single session of 90 min, delivered to individuals with PTSD (Germain et al., 2007). Moreover, in one study a single session of CBT-I was superior to both two and eight sessions, albeit this was not as powerful as the optimal four sessions (Edinger, Wohlgemuth, Radtke, Coffman, & Carney, 2007). As such, a single session of CBT-I has the capacity to have impact on insomnia symptomology. Considering the increased vulnerability to develop insomnia within the prison environment, however, it may be prudent to address insomnia during its acute phase, as it is likely to be easier to treat and have better prognostic outcomes as opposed to when it is in its chronic phase (Ellis, Gehrman, Espie, Riemann, & Perlis, 2012). To that end and on the basis that a single session is efficacious within the context of chronic insomnia, Ellis and colleagues developed a “one-shot” CBT-I intervention specifically designed to circumvent the transition from acute to chronic insomnia (Ellis, Cushing, & Germain, 2015). The one-shot involves a self-help pamphlet and a single 60–70 min therapy session. In their first study, using a community sample from the general population, Ellis and colleagues showed an initial remission rate of 60% in those who received the intervention compared to 15% in the Wait List Control group one month post therapy. Furthermore, at three months posttherapy, 73% of those in the treatment group had remitted. In a subsequent study it was demonstrated that, in addition to being equally effective delivered in groups as it was in an individual face-to-face format, there were significant reductions in depression and anxiety symptomology one month posttreatment (Boullin, Ellwood, & Ellis, 2016). As such it appears that the brief one-shot treatment may be a beneficial intervention and adaptable to the prison setting.

Therefore, the aim of the present study was to examine the preliminary efficacy and effectiveness of a one-shot CBT-I intervention for acute insomnia. It was hypothesized that the intervention would be an effective treatment, as evidenced by significant reductions in insomnia-related symptoms and improvements in sleep in adult male prisoners post treatment. A secondary hypothesis was that the one-shot CBT-I intervention would also be associated with significant reductions in depressive and anxious symptomology.

## Method

### Design

An open trial of a one-shot CBT-I intervention in a prison setting to inmates with acute insomnia was tested. It was decided that there would be no control group, as the intervention aimed to help individuals who suffer from acute insomnia, which has a short duration (2 weeks to 3 months; Ellis et al., 2012). As such, withholding treatment from a control group could exacerbate their symptoms and lead to them developing chronic insomnia, for which the specific intervention under examination has yet to be tested and alternative treatments within this particular prison are limited. Ethical approval was obtained from the Ethics Committee at Northumbria University, the National Health Service Health Research Authority, and the North East Forensic Psychology Services Ethics Committee.

### Participants

A consecutive series of 30 Category C male prisoners (a closed prison for individuals who cannot be trusted in open conditions; however, the likelihood of them escaping is low) aged 21–60 were recruited over a period of four months. All participants ( $n = 30$ ) identified themselves as White British and had at least six months left on their sentence. All had been remanded in custody for at least six months prior to being transferred to the current prison. Participants were selected through

self-referral or staff referral to a Mental Health in Reach Team in a prison in the North East of the United Kingdom. To be included in the study, participants had to have a principle complaint of acute insomnia. Acute insomnia was defined based on meeting all criteria for DSM-5 Insomnia Disorder (American Psychiatric Association, 2013), but with a duration of between two weeks and three months (see procedure). Participants were excluded if, following clinical interview, it was determined that they did not have insomnia or it was already chronic (defined as greater than three months). Moreover, if participants presented with any co-morbidity, physical or psychological, or substance abuse they were excluded from taking part. In these cases participants were referred to specialist medical and psychological services for treatment as usual.

## **Materials**

### ***Insomnia severity index***

The Insomnia Severity Index (ISI) is a 7-item questionnaire used to assess the nature, severity, and impact of insomnia (Morin, 1993). A 5-point Likert scale (0 = not at all to 4 = very severe) is used to rate each item. The total questionnaire yields a score between 0 and 28. Reliability and validity of the ISI is well documented (Bastien, Vallieres, & Morin, 2001), showing a high level of internal consistency (Cronbach's alpha = 0.74). The ISI has also been shown to be a clinically useful outcome tool in insomnia treatment research (Morin, Belleville, Bélanger, & Ivers, 2011).

### ***Patient health questionnaire***

The Patient Health Questionnaire (PHQ) is a 9-item questionnaire used to screen, diagnose, and monitor the severity of depression (Kroenke, Spitzer, & Williams, 2001). It uses a 4-point Likert scale (0 = not at all – 3 = everyday), yielding a score between 0 and 27. The PHQ has high levels of internal consistency, with a Cronbach's alpha of 0.89 (Kroenke et al., 2001), identifying it as a valid and reliable instrument. For the present study, Question 3 (Trouble Falling asleep or staying asleep or sleeping too much) was omitted from all analyses (as such the range for the PHQ was between 0 and 24).

### ***Generalized anxiety disorder***

The Generalized Anxiety Disorder (GAD) is a 7-item questionnaire used to measure anxiety symptoms (Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD uses a 4-point Likert scale (0 = not at all to 3 = every day) totaling a score between 0 and 21. It shows high levels of internal consistency (Cronbach's alpha = 0.91), suggesting it is a valid and reliable psychometric instrument for assessing the symptoms of anxiety, and has been used with a wide variety of populations (Löwe et al., 2008).

### ***Daily sleep diary***

The Consensus Sleep Diary (Carney et al., 2012) was used throughout the present study. The sleep diary asks the participant to report (a) what time the participant went to bed, (b) what time they intended to sleep, (c) how long they were awake during the night, (d) what time they woke for the final time, (e) what time they got out of bed, and (f) how much sleep the participant felt they got that night. Participants were instructed to estimate these times, not relying on a clock, and complete the diary every morning within a 20–40-min window of waking. From this data the following variables were derived by averaging the previous week's data: Time in Bed (TIB), Sleep Latency (SL), Wake After Sleep Onset (WASO), Total Sleep Time (TST), and Sleep Efficiency (SE). SE was calculated using the following formula ( $TST/TIB \times 100$ ) to derive a percentage.

### ***“One-shot” CBT-I intervention***

Full details of the one-shot intervention have been described previously (see Ellis et al., 2015, for more details). The single CBT-I session remained the same as it had in the two previous studies (Boullin et al., 2016; Ellis et al., 2015) except two diagrams were used to facilitate discussion of the body's natural sleep cycle and how predisposing, precipitating, and perpetuating factors can affect



sleep: Borberly's two-process model of sleep (Borbély, 1982) and Spielman's 3P model (Spielman, Saskin, & Thorpy, 1987) respectively. As with the previous studies, Sleep Restriction, including the rules for weekly titration, was the main focus of the single session, and the previous weeks' sleep diaries were used to set the initial prescribed sleep schedule (i.e., time to bed and time out of bed). The initial prescription was based upon the average total sleep time from the previous week becoming the time in bed for the following week. Finally, participants were told to continue titration at weekly intervals until they had reached a stable SE of 85–90% and were satisfied with their sleep. The self-help pamphlet outlined the principles of stimulus control, cognitive control, and the use of imagery distraction techniques (a copy of the pamphlet is available from the corresponding author). There were two modifications made to the pamphlet in order to accommodate the prison environment: (a) where previously stimulus-control instructions suggested the bedroom should only be used for sleep and sex, sex was omitted from these instructions, and (b) within the stimulus-control instructions, participants were not instructed to leave the bedroom but rather identify a “nonsleep” space in their cell and go there if they were unable to sleep. The single session remained the same as it had in the two previous studies (Boullin et al., 2016; Ellis et al., 2015) except two diagrams were used to facilitate discussion on the body's natural sleep cycle and how predisposing, precipitating, and perpetuating factors can affect sleep: Borberly's two-process model of sleep (Borbély, 1982) and Spielman's 3P model (Spielman et al., 1987) respectively. As with the previous studies, sleep restriction, including the rules for weekly titration, was the main focus of the single session, and the previous weeks' sleep diaries were used to set the initial prescribed sleep schedule (i.e., time to bed and time out of bed). The initial prescription was based upon the average total sleep time from the previous week becoming the time in bed for the following week. Finally, participants were told to continue titration at weekly intervals until they had reached a stable SE of 85–90% and were satisfied with their sleep. The same therapist (CR) delivered the intervention in an individual face-to-face setting. One other modification to the study protocol from that of the previous studies was that participants were seen at weekly intervals over the following four weeks (i.e., until study completion), if they requested, to ensure that their sleep diary calculations and titration schedules were correct. No additional guidance was given at these sessions. Of the 30 prisoners who took part, 29 (96.67%) attended an additional support session.

## **Procedure**

Participants that had self-referred or been referred to the Mental Health in Reach Team on the basis of a principle complaint of acute insomnia were specifically referred to the first author for assessment and treatment (CR). CR is a senior assistant psychologist with eight years of experience working with a closed forensic setting and was trained and supervised by the corresponding author with respect to the one-shot CBT-I (JGE, a qualified somnologist with 8 years' experience delivering CBT-I). As is standard in this environment, full clinical interviews are undertaken on prisoners when they either self-refer or are referred to the Mental Health in Reach Team for any issue. For the present study, however, an additional sleep disorder clinical interview was undertaken by the clinician (CR) to determine whether participants met criteria for acute insomnia and whether they had an occult sleep disorder that may have been masking as acute insomnia (e.g., obstructive sleep apnea, periodic limb movement disorder, a circadian rhythm disorder). Participants who met study criteria were informed about the nature, duration, and level of support available for the study and asked whether they would like to take part. If participants agreed, informed consent was gained and the participant enrolled. At this meeting the participant was given the sleep diary, instructed on its use, and allowed to complete the PHQ, GAD, and ISI for baseline assessment. Appointments were also made for the following week for the intervention session and for the final follow-up assessment (four weeks following the intervention). At the follow-up appointment, sleep diaries were collected and participants completed the same measures from baseline. Finally, participants were debriefed and, if requested, were referred on to another service.

### Prison routine/environment

Prisoners would be locked in their cells between 19:00 and 19:30 in the evening and remain there until between 07:00 and 07:30 in the morning. On waking, and if employed, prisoners would leave their wing at 08:00, return to their cells for lunch between 11:30 and 13:30, and then return to work from 14:00 until 16:00. The evening meal, in their cell, would be at approximately 17:00 and then there would be an opportunity to leave the cell for recreation for approximately 1–2 hr prior to being locked in for the night. During recreation periods, all prisoners had access to the gym and an outside courtyard. All cells contained a single bed, television, small window, curtains, and bathroom. Although prisoners had control over what time they turned out the lights at night, they had no control over ambient temperature or noise levels.

### Analytic strategy

Paired *t*-tests were used to determine significant differences between pre and post scores on the ISI, GAD, and PHQ. Additionally, paired *t*-tests were undertaken on sleep diary-derived measures of SL, WASO, TST, and SE. Within-group Cohen's *d*'s were then calculated to examine the effect size of changes on the scales (ISI, GAD-7, and PHQ) and sleep variables (SL, WASO, TST, and SE). Finally, remission status was defined as a reduction > 7 points on the ISI between baseline and follow-up (Morin et al., 2011). Missing data of less than 5% on measures was treated by mean substitution and over 5% by casewise deletion.

### Results

During the study duration, 30 referrals (both self and by others) were made. No participants were excluded based on inclusion or exclusion criteria and no participant refused to enroll and complete the intervention and assessments. Data was collected from 30 males, mean age  $33.13 \pm 8.85$  years. All participants worked at the time of the intervention. Descriptive data on the sample can be seen in Table 1.

Paired *t*-tests showed that participants experienced a significant reduction in insomnia-related symptoms (ISI) one month postintervention ( $t[29] = 12.65$ ,  $p < 0.001$ ). Significant reductions were also observed for both anxious ( $t[29] = 5.03$ ,  $p < 0.001$ ) and depressive symptomology ( $t[29] = 4.88$ ,  $p < 0.001$ ). In terms of changes in sleep continuity, there were significant increases in TST ( $t[29] = 4.93$ ,  $p < 0.001$ ) and SE ( $t[29] = 5.64$ ,  $p < 0.001$ ) at follow-up. Moreover, there were significant reductions in SL ( $t[29] = 5.92$ ,  $p < 0.001$ ) and WASO ( $t[29] = 5.57$ ,  $p < 0.001$ ). The effect sizes, calculated using between group mean change scores, were all moderate to strong ranging between 0.77 and 2.35 (see Table 1).

Remission rates based upon pre–post changes in ISI score were 73.33%, and compliance (as defined by the number of nights participants stayed within their prescribed time to bed or prescribed time out of bed in the first week posttherapy within a margin of 15 min) was 90%.

**Table 1.** Pre-Post Descriptives and Repeated Measures Effect Sizes

	Baseline <i>n</i> = 30	Follow-up <i>n</i> = 30	<i>p</i>	dRM
ISI	18.53 (3.56)	9.56 (4.31)	0.001	2.35
PHQ	12.80 (6.06)	7.33 (3.91)	0.001	0.77
GAD7	12.53 (5.27)	7.50 (4.11)	0.001	0.83
Sleep Latency	63.33 (22.5)	37.36 (23.04)	0.001	1.49
Wake After Sleep Onset	12.33 (6.29)	7.33 (4.58)	0.001	0.93
Total Sleep Time	6.02 (1.64)	7.13 (.80)	0.001	0.87
Sleep Efficiency	66.76 (16.11)	80.80 (10.16)	0.001	0.91



## Discussion

The aim of the present study was to determine the preliminary effectiveness and efficacy of a one-shot CBT-I intervention in male prisoners with acute insomnia. A secondary aim was to determine whether the treatment also reduced symptoms of depression and anxiety. With respect to the primary aim, the intervention was found to be efficacious, with 73% of prisoners remitting at the one-month follow-up. Significant reductions in insomnia symptoms, and improvements in subjective sleep from the sleep diary, were also observed. Furthermore, the effect sizes on these variables were also strong, ranging from moderate to large. While these findings are in line with the previous literature on the impact of a single-shot CBT-I intervention for acute insomnia (Boullin et al., 2016; Ellis et al., 2015), they also suggest that the intervention can be successfully delivered in a prison environment with minor modifications. Considering the relatively high prevalence of chronic insomnia in prison inmates (i.e., 61.6%) and the existing literature suggesting the process of incarceration may act as a precipitant to the development of insomnia itself, the results should be viewed as an important first step in managing insomnia in the prison inmates with the potential to reduce or prevent violence, suicide attempts, and health care utilization of prison inmates. Interestingly, all those who took part in the study were asked what they felt were the most beneficial aspects of the intervention. Anecdotally, most of the comments revolved around the sleep diary, which helped them identify behavioral patterns impacting on their sleep, and the pamphlet, with a special emphasis on the stimulus control instructions. It is, however, speculative to suggest that the sleep diary and stimulus control instructions were the most powerful component of the intervention in this context, rather that this is what the population felt were the most helpful.

The results also demonstrated the intervention was effective in reducing anxiety and depression symptoms (i.e., Aim 2). Again, these findings support a prior study testing the effectiveness of reducing mood symptoms using a single-shot CBT-I intervention (Boullin et al., 2016). As rates of anxiety and depression are high in prison populations, and in conjunction with insomnia, have been associated with increased suicide risk (Hassan et al., 2013), these findings are particularly relevant in this context. Prison suicide has been a long-standing issue across the globe (Webb, 2017) and to have another potential intervention to help manage suicide risk in this environment is important. Future studies should examine the effectiveness of the present intervention on reducing suicidal thoughts, intentions, and actions or attempts as well as other risky behaviours (self-mutilation and cutting, substance use).

This study had several limitations. First, there was no comparator control condition. The decision not to have a control group was made on ethical grounds when studying prisoners (a population deemed “vulnerable” in terms of manipulating for research) with acute insomnia. While this significantly limits our capacity to discuss efficacy, beyond preliminary, this study is an important first step to demonstrate the feasibility of the intervention in this context. Data from Ellis et al. (2015) RCT demonstrated a one-month remission rate of 15% in the control group compared to a 60% remission rate in participants who were treated using a similar one-shot CBT-I intervention. Further, the second study using the one-shot intervention demonstrated a one-month remission rate, following treatment, of 76.28%, which is broadly comparable to the results from the present study. Considering the remission rate in the present study (i.e., 73%), it appears that the intervention is helpful when used in this context, although therapist factors should not be ignored. However, as we do not know the natural remission rate for acute insomnia in a prison population, this suggestion remains speculative. Future research should examine the efficacy of the intervention in a fully powered randomized control trial, perhaps with a full CBT-I arm embedded for those with chronic insomnia. Second is the follow-up period in the present study. A one-month follow-up is a relatively short time to track both the durability and indeed the potential for relapse following delivery of the intervention. While this was chosen on a largely theoretical basis (i.e., the intervention was designed to prevent the transition from acute to chronic insomnia) and feasibility given the environmental setting, future studies are needed to determine the long-term impact of the intervention. Other

potential factors that could have resulted in the superior outcomes, at least compared to the earlier RCT (Ellis et al., 2015), include the fact that (a) the sample only included those who were relatively healthy and (b) the availability of the additional support sessions. With regard to the latter issue, however, although four support sessions were offered, the uptake was limited with 29 prisoners attending an additional session. Unfortunately an analysis as to whether the additional support sessions impacted on treatment cannot be undertaken due to the disparity in who did and who did not utilize those sessions.

A degree of caution should be taken when generalizing the findings from the current study to other prison environments. The forensic setting utilized in this study was unique, as it will probably be in most prison settings. Prisons are likely to have differing routines, environmental configurations, and different classes of prisoners, severity of crimes, or offenses, each of which could exert impact on both the practicality and acceptability of integrating this intervention. Specifically in the present study the locations where prisoners resided were single cells (i.e., each participant had a cell to himself, one single bed, and a chair). This allowed them to use their cell to complete the behavioral components of the intervention (i.e., stimulus control and sleep restriction) without disturbing other prisoners. While not entirely comparable, it is known that partners who share a sleep environment can influence the process of full CBT-I (Ellis, Deary, & Troxel, 2015) and so it would be interesting to see how the results would fare if incorporated into a shared cell environment. Furthermore, as the present study only used a sample of male prisoners, it is unknown whether these effects would be comparable in a women's prison or with juvenile offenders. Considering the prevalence of insomnia is higher in incarcerated women compared to men (Dewa et al., 2017), a comparable study in a women's prison is needed.

In summary, the identification and management of insomnia is fundamental in the prison environment due to the forensic population being more vulnerable to developing insomnia (Elger, 2004) and the established link between insomnia, poor mood, and suicide risk (Carli et al., 2011). The findings from the present study suggest that a single shot of CBT-I, with an accompanying self-help pamphlet, has some promise in this setting for individuals with acute insomnia. Further research into this relatively uncharted area of insomnia treatment, however, is warranted to determine whether these effects are comparable in other closed forensic settings and populations.

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